

VHF LOW BAND SYNTHESIZED  
FM TWO-WAY RADIO

# TK-620(H)

## SERVICE MANUAL

KENWOOD

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## SUPPLEMENT



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# TK-620(H)

## GENERAL/DISASSEMBLY FOR REPAIR

### General

#### FCC COMPLIANCE AND TYPE ACCEPTANCE NUMBERS

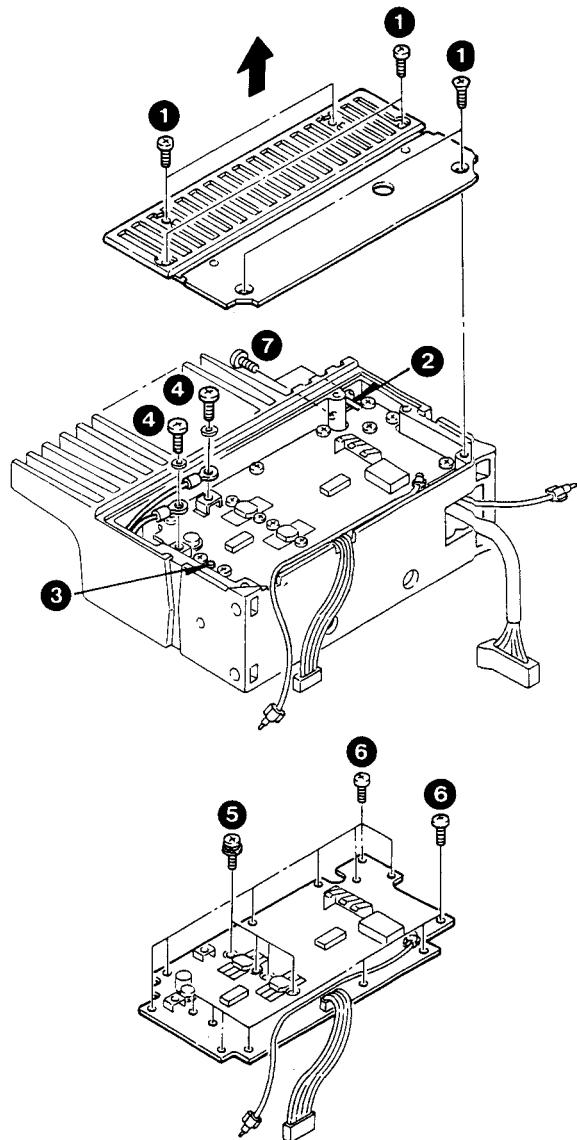
Type acceptance number	Frequency range	Compliance
ALH9TKTK-620H-1	29.7 ~ 37.0MHz	Parts 22 and 90
ALH9TKTK-620H-2	37.0 ~ 50.0MHz	

### Disassembly for Repair

#### Disassembly of Final Unit

##### 1. Final unit (Final) (X45-3240-XX) side

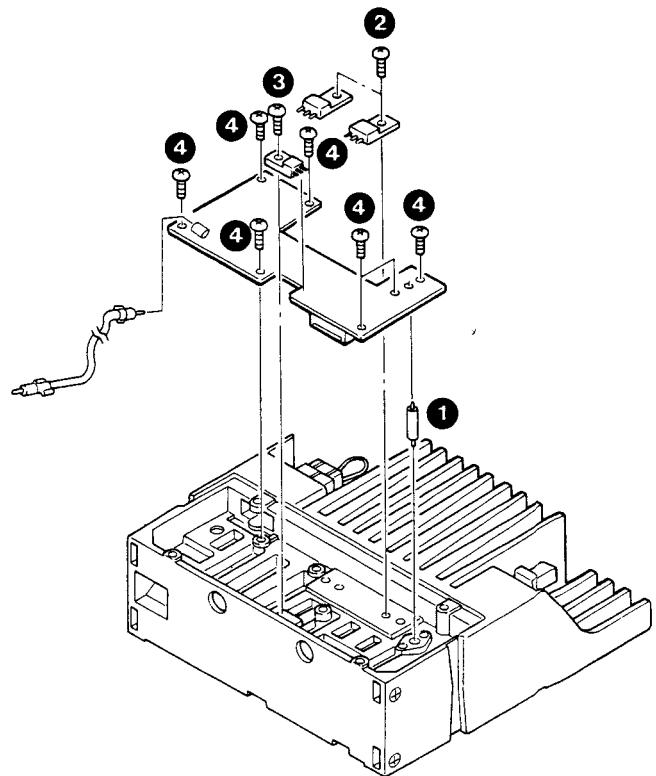
1. Remove the six screws (1) fixing the shielding cover to remove the shielding cover.
2. Remove the soldered part (2) of the VHF connector and that (3) of the lead wire (coaxial cable installed through) from the final unit.
3. Remove the two screws (4) fixing the lead wires of the power connector.
4. Remove the four screws (5) fixing the transistor from the heat sink.
5. Remove the 15 screws (6) fixing the final unit from the heat sink to remove the final unit.
6. Remove the two screws (7) fixing the VHF connector to remove the connector from the heat sink.



## DISASSEMBLY FOR REPAIR

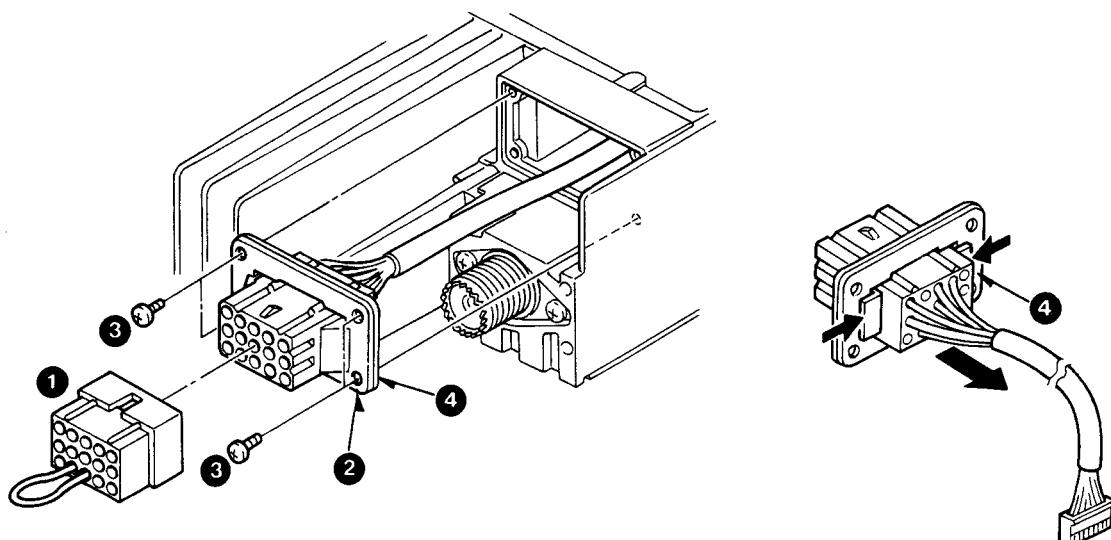
### 2. Final unit (Drive) (X45-3260-XX) side

1. Remove the soldered part (①) of the read wire (coaxial cable installed through) from the final unit.
2. Remove the two screws (②) fixing the transistor from the heat sink.
3. Remove the screw (③) fixing the transistor from the heat sink.
4. Remove the seven screws (④) fixing the final unit from the heat sink to remove the final unit.



### 3. Removal of accessory connector

1. Remove the four screws (③) fixing the fitting (②) of the to the heat sink, and pull out the cable and the accessory connector (①) together.
2. Remove the packing (④) from the fitting, then push the part indicated by the arrows (←) and pull out the connector in the direction of the arrow (←).



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## CIRCUIT DESCRIPTION

### Transmitter Circuit

The output signal, at the level of approximately 20mW, from Z4 (Transmitter Voltage Controlled Oscillator, TX VCO) is fed through an 8dB attenuator, then it is amplified by RF amplifiers Q101 (2SC2538-22-A), Q102 (TX pre-driver, 2SC1971) and Q103 (TX driver, 2SC1972), up to a sufficient level for driving final power amplifier transistors.

The driver output signal is applied to each of the final power amplifier transistors Q1 and Q2 (2SC2904 x 2), after going through a two-way power splitter. The transmit signal is amplified to a final transmit power at this stage. The signal is then combined and impedance and matched at the matching circuit. After the above process, the signal passes through K1 (transmit/receive switching relay), a Chebyshev type low-pass filter (L18, L19 and L20), and a forward and reflective power detector circuit, then it is routed to the antenna terminal.

The forward and reflected power detector circuit is located between the low-pass filter and the antenna terminal to maintain output power and to detect antenna load variations to protect the TX power amplifier stages.

The power detector circuit incorporates a broad band dual directional coupler to cover a wide range of frequencies.

The forward power is detected by D2 (1SS101) and is applied to a differential amplifier Q4 and Q5 (2SC3326(A) x 2), where the signal is compared with a reference voltage, after going through VR1 (APC adjustment pot). The output signal from the differential amplifier is applied to Q104 (2SB951A(Q)), which controls a supply voltage to Q101 (RF amplifier), Q102 (TX pre-driver) and Q103 (TX driver) to maintain a constant transmitter output power.

The reflected power is detected by D1 (1SS101), and it is also applied to the differential amplifier (Q4 and Q5).

If the antenna impedance matching becomes abnormal, the output voltage of the reflected power detector increases and this makes the supply voltage, to the power amplifier stages, to drop, causing the transmitter output power to be reduced. This prevents from the output stage transistors being damaged due to the excessive current.

In addition, the temperature rise in the transmitter power amplifier circuit is detected by TH1 (thermister). If the temperature exceeds the preset value because of continuous transmission or an ambient temperature rise, the DC amplifier Q3 (2SC2712(Y)) lowers the reference voltage of the differential amplifier, reducing the transmitter output power to a safe level to prevent damages to the internal components.

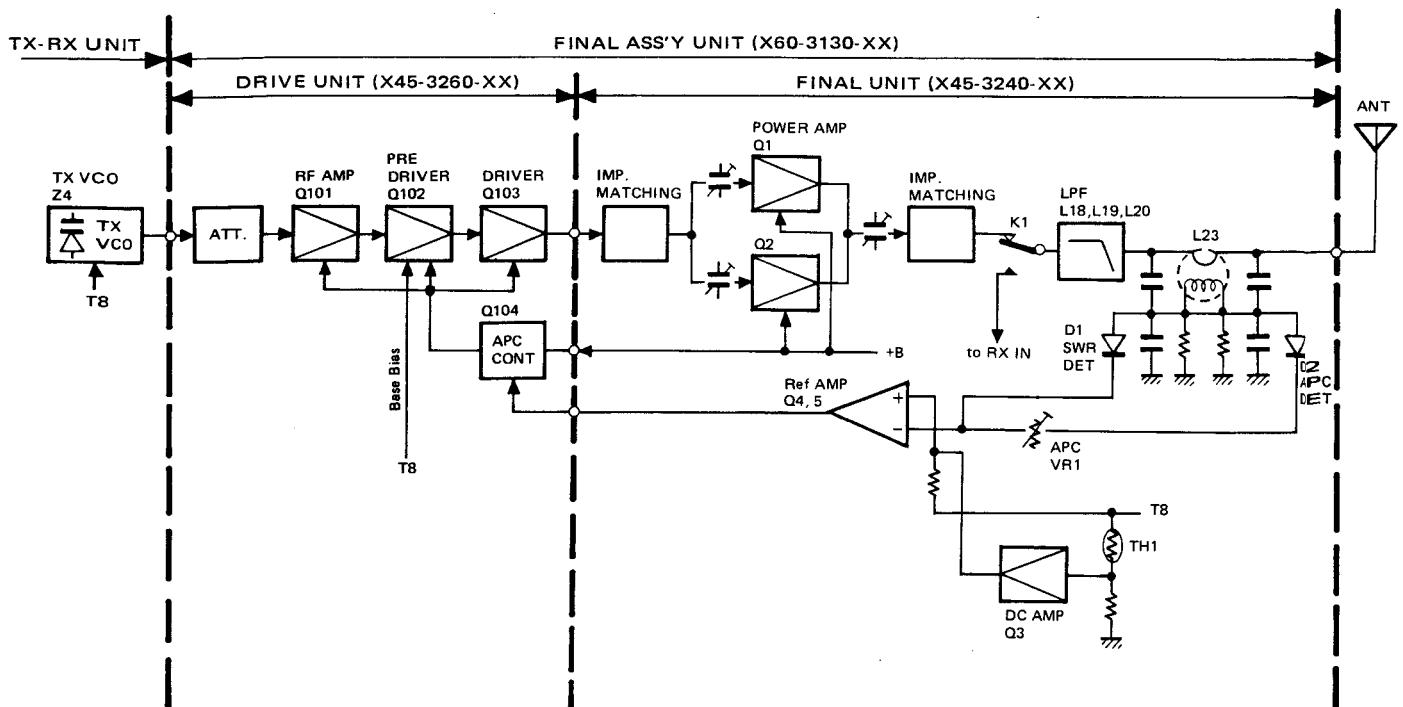


Fig. 1 Transmitter block diagram

## CIRCUIT DESCRIPTION

### Receiver Circuit

The incoming received signal from the antenna terminal passes through the low-pass filter and the transmit/receive switching relay (K1), then is fed into CN1 in the TX-RX unit.

The signal at CN1 is fed through L13 and L14 (band-pass filter), where undesired signal is eliminated, amplified by RF amplifiers Q6 and Q7 (2SK582 x 2), band limited by another band-pass filter, L17 and L18 then it is applied to D8 (double balanced modulator, ND487C2-3R).

A signal generated by the Common Frequency Synthesizer (COM PLL) is applied as a first local signal to D8, for a down conversion of the receive signal to the first IF (10.7 MHz). It is amplified by Q8 and Q9 (first IF amplifier, 2SK582 x 2).

An incoming signal containing an impulse noise from the antenna is frequency selected at 22MHz and it is amplified by Q1 (2SC2715(Y)) and Q2 (2SC2714(Y)) in Z9 (noise blanker unit, NB unit). It is then AM detected by D1 (HSM88AS).

The detected noise component is waveform shaped into a pulse, synchronizing with the noise, by a following switching circuit Q4 (2SA1162(Y)). The pulse is then inverted by the switching circuit Q5 (2SC2712(Y)), and applied to the gate circuit in the first IF stage.

The gate circuit consists of D9 and D10 (HSM88AS x 2), If there is no incoming impulse noise, those diodes are held on by the bias from the switching circuit Q5, and passes the IF signal. If an impulse noise is present, the bias from Q5 is interrupted momentarily, and the gate turns off to prevent the IF signal from passing through.

The DC component detected by D1 is amplified by Q3 (2SC2715(Y)) and used for an automatic gain control of the RF amplifiers Q1 and Q2, in order to prevent a saturation.

tion of the RF amplifier stages in a high field intensity area and to secure noise detection sensitivity.

The IF signal is filtered by XF1 (6-pole monolithic crystal filter), and amplified again by Q12 (IF amplifier, 2SK302(GR)), and is sent to Z8 (module unit (IF)).

The first IF signal sent to IC1 (FM IF system, MC3361D) in Z8. The signal is heterodyned again to 455kHz, using the second local signal generated by the crystal oscillator (11.155MHz), at the second mixer in IC1. The second IF signal is filtered by CF1 (ceramic filter), amplified by limiting amplifiers in IC1, and is detected as an FM signal.

The detected signal is sent from Z8 as the DET OUT signal to Z10 (band-pass filter/voltage controlled amplifier), where the signal is amplified. After this amplification, the signal is routed to CN7 as the DET signal. Unless the optional signaling unit is connected, the signal is looped back to CN7 by a short plug (CN15) and it is routed back to Z10 again. In Z10, the signal passes through a low-pass filter and high-pass filter consists of IC2 (NJM4558M) to attenuate any signals below 300Hz or above 3kHz. The signal then enters an electronic volume control (IC3, M5222FP).

The volume control changes a DC voltage applied to IC3, which controls the gain of IC3. The output of IC3 has a -6dB/Octave de-emphasis characteristics for a frequency range between 300Hz and 3kHz. This signal passes through Q16 and Q17 (squench switch, 2SC3326(A) x 2), and it is amplified to drive the speaker by IC1 (audio-frequency power amplifier,  $\mu$ PC1242H).

In addition to the receive signal, the ALERT signal from the signaling unit is applied to IC1, therefore, an alert tone can be heard from the speaker if so an optional accessory board is installed. This IC1 output is sent to the accessory connector, J3, of the final unit, and drives an internal speaker connected to it. And an external speaker may be driven directly by connecting it to J3.

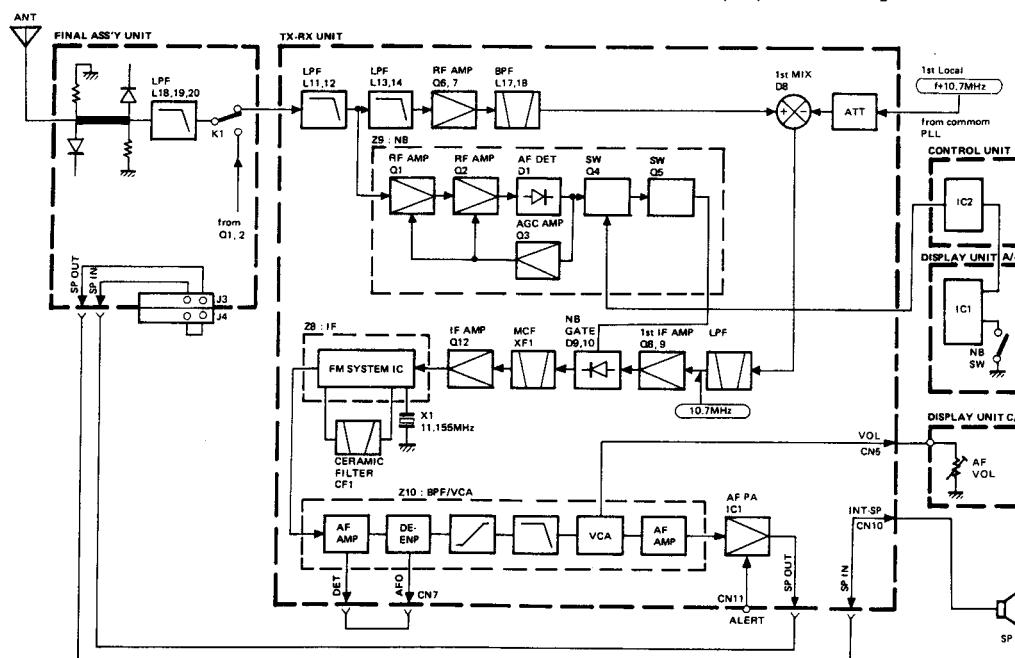


Fig. 2 Receiver block diagram

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## SEMICONDUCTOR DATA/DESCRIPTION OF COMPONENTS

### Semiconductor Data

#### 2SC2904 : Power amplifier (Final unit Q1, 2)

- Electrical characteristics

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Collector - base breakdown voltage	$V_{(BR)CBO}$	$I_C = 20mA, I_E = 0$	50			V
Emitter - base breakdown voltage	$V_{(BR)EBO}$	$I_E = 20mA, I_C = 0$	5			V
Collector - emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.1A, R_{BE} = \infty$	20			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = 15V, I_E = 0$			5	mA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 3V, I_C = 0$			5	mA
DC current amplification factor	$h_{FE}$	$V_{CE} = 10V, I_C = 1A$	10	50	180	—
Output power	$P_O$	$f = 30MHz, V_{CC} = 12.5V, P_{in} = 7W$	100	110		W
Collector efficiency	$\eta_C$	$f = 30MHz, V_{CC} = 12.5V, P_{in} = 7W$	55	60		%

( $T_c = 25^\circ C$ )

### Description of Components

#### FINAL ASS'Y UNIT (X60-3130-XX)

#### FINAL UNIT (X45-3240-XX) : FINAL ASS'Y

Component	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1, 2	2SC2904	Power amplifier	
Q3	2SC2712(Y)	Protector amplifier	Temperature.
Q4, 5	2SC2712(Y)	APC controller	
D1, 2	1SS101	Detector	
D3	1SS184	Separator	
D4	SG-5LR	Protection	Contrary polar protection.
D5	1SS184	A standard voltage	
D6	1SS184	Protector	

#### DRIVE UNIT (X45-3260-XX) : FINAL ASS'Y

Component	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1O1	2SC2538-22-A	RF amplifier	
Q1O2	2SC1971	Pre-driver amplifier	
Q1O3	2SC1972	Driver amplifier	
Q1O4	2SB951A(Q)	APC amplifier	
D1O1, 102	1SS184	Bias control	

## PARTS LIST

\* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No.	Address	New Parts	Parts No.	Description	Desti- nation	Re- marks
<b>TK-620 (H)</b>						
1	3B		A01-1031-12	CASE (LOWER)		
2	1B		A01-1064-02	CASE (UPPER)		
4	1A		A20-2616-13	PANEL ASSY		
6	1A		B03-0545-03	DRESSING PLATE (TX-BUSY-CALL)		
7	1A		B03-0552-03	DRESSING PLATE (MONI-NB)		
7	1A		B03-0553-03	DRESSING PLATE (SCAN)		
8	1A		B11-0437-04	FILTER		
10	3B	*	B40-3954-04	MODEL NAME PLATE	K	
10	3B	*	B40-3955-04	MODEL NAME PLATE	K2	
11	2D		B46-0409-20	WARRANTY CARD		
12	2D		B50-8302-00	INSTRUCTION MANUAL		
14	1D		E30-2036-05	GROUND LEAD		
15	1C	*	E30-2158-05	DC CORD		
CN15			E31-3270-05	SHORT PLUG (12P)		
J4	2B		E31-3228-05	SHORT PLUG (ACC)		
W8	1A		E31-3225-05	CONNECTING WIRE (SP)		
20	1D		F06-2524-05	FUSE (25A)		
21	3A		F11-1057-03	SHIELDING COVER (LOWER)		
22	2A		F11-1121-03	SHIELDING COVER (UPPER)		
27	2A		G09-0405-05	SPRING (CH)		
28	1A		G09-0418-05	SPRING (VOL)		
29	1A		G10-0652-04	FELT (SP)		
30	3B		G10-0663-04	FELT (100 x 85)		
31	1B, 3B		G10-0667-04	FELT (150 x 10)		
32	1B, 3B		G16-0516-14	SHEET (150 x 100)		
33	1B, 3B		G16-0517-04	SHEET (20 x 130)		
34	1A		G53-0535-04	PACKING (MONI/NB)		
37	2D		H02-0605-04	INNER PACKING CASE		
38	3C	*	H01-8268-04	ITEM CARTON BOX		
39	2C		H10-2647-03	POLYSTYRENE FOAMED FIX (FRONT)		
40	2D		H10-2654-03	POLYSTYRENE FOAMED FIX (REAR)		
41	1C		H12-1415-04	PACKING FIXTURE		
41-1	3D		H11-0827-04	PACKING FIXTURE		
42	1D		H25-0123-04	PROTECTION BAG (DC CORD)		
43	1D		H25-0096-04	PROTECTION BAG (FUSE)		
44	2D		H25-0724-04	PROTECTION BAG (RADIO)		
45	1C		H25-0726-04	PROTECTION BAG (MIC)		
47	1D		J19-1376-15	MIC HANGER		
48	1A		J21-4214-03	MOUNTING HARDWARE (VOL/SQL)		
49	1A		J21-4215-03	MOUNTING HARDWARE (SP)		
50	1D		J29-0422-13	MOUNTING BRACKET		
51	1D		J54-0060-03	STAY		
53	1A		K27-0498-04	PUSH KNOB (MONI, NB)		
54	2A		K29-3075-03	KNOB (CH)		
55	1A		K29-3076-13	KNOB (VOL)		
56	1A		K29-3077-03	KNOB (SQL)		
59	1D		N89-2608-41	BINDING HEAD TAPTRITE SCREW		
A	1A, 1B		N99-0330-05	SCREW SET		
B	1A		N09-0673-05	SCREW (M3 x 6, SP)		
C	1A, 2D		N09-0675-05	SCREW		
			N09-2030-05	FLAT HEAD MACHINE SCREW		

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Ref. No.	Address	New Parts	Parts No.	Description			Desti- nation	Re- marks
D	1B, 3B		N35-3008-45	BINDING HEAD MACHINE SCREW				
E	2A, 3A		N87-2606-46	BINDING HEAD MACHINE SCREW				
62	1A		T07-0247-05	LOUDSPEAKER (FULL RANGE)				
63	2C		T91-0362-05	MICROPHONE (WITH CORD)				
67	2A		X53-3060-10	CONTROL UNIT				
68	1A		X54-3040-10	DISPLAY UNIT				
69	3A		X57-3260-10	TX-RX UNIT			K	
69	3A	*	X57-3260-11	TX-RX UNIT			K2	
70	2B	*	X60-3130-10	FINAL ASSY			K	
70	2B	*	X60-3130-11	FINAL ASSY			K2	
<b>FINAL UNIT (X45-3240-XX) -10 : K -11 : K2</b>								
C1			CM73F2H331J	CHIP C	330PF	J		
C2			CM73F2H560J	CHIP C	56PF	J		
C2			CM73F2H750J	CHIP C	75PF	J		
C3			CC73FCH1H471J	CHIP C	470PF	J		
C8, 9			CM73F2H751J	CHIP C	750PF	J		
C8, 9			CM73F2H821J	CHIP C	820PF	J		
C10, 11			C90-2025-05	ELECTRO	4.7UF	25WV		
C12, 13			C91-1056-05	CHIP C	4700PF	K		
C14, 15			CE04EW1E471M	ELECTRO	470UF	25WV		
C16, 17			CM73F2H471J	CHIP C	470PF	J	K2	
C16, 17			CM73F2H681J	CHIP C	680PF	J	K	
C18			CM73F2H151J	CHIP C	150PF	J	K	
C18			CM73F2H221J	CHIP C	220PF	J	K2	
C22			CM73F2H470J	CHIP C	47PF	J	K2	
C22			CM73F2H750J	CHIP C	75PF	J	K	
C23			CM73F2H471J	CHIP C	470PF	J		
C24			C91-1056-05	CHIP C	4700PF	K		
C25			CM73F2H620J	CHIP C	62PF	J		
C25			CM73F2H820J	CHIP C	82PF	J	K2	
C26			CM73F2H080D	CHIP C	8.0PF	D	K	
C27			CM73F2H101J	CHIP C	100PF	J		
C27			CM73F2H151J	CHIP C	150PF	J	K	
C28			CM73F2H180J	CHIP C	18PF	J	K2	
C28			CM73F2H220J	CHIP C	22PF	J	K	
C29			CM73F2H121J	CHIP C	120PF	J	K	
C29			CM73F2H820J	CHIP C	82PF	J		
C30			CM73F2H430J	CHIP C	43PF	J	K2	
C30			CM73F2H510J	CHIP C	51PF	J	K	
C31			CM73F2H330J	CHIP C	33PF	J	K2	
C31			CM73F2H470J	CHIP C	47PF	J	K	
C32, 33			CM73F2H020C	CHIP C	2.0PF	C		
C34			CC73FCH1H560J	CHIP C	56PF	J		
C34			CC73FCH1H820J	CHIP C	82PF	J		
C35			CC73FCH1H330J	CHIP C	33PF	J		
C36 - 47			CK73FB1H472K	CHIP C	4700PF	K	K	
TC1, 2			C05-0367-05	TRIMMING CAP.	420PF			
TC3			C05-0336-05	TRIMMING CAP.	350PF			
A1			E29-0468-14	LEAD PLATE (ANT)				
CN1			E04-0159-05	RF COAXIAL CABLE RECEPTACLE				
CN2, 3			E23-0491-05	TERMINAL				

E : Scandinavia & Europe

K : USA

P : Canada

U : PX (Far East, Hawaii)

T : England

M : Other Areas

UE : AAFES (Europe)

X : Australia

▲ indicates safety critical components.

## PARTS LIST

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Ref. No.	Address	New Parts	Parts No.	Description				Desti-nation	Re-marks
CN4			E40-5166-05	PIN CONNECTOR	(6P)				
W1			E31-3273-05	CONNECTOR WITH LEAD	(5P)				
A4			F10-1391-04	SHIELDING PLATE					
A2			J31-0531-04	COLLAR					
A3			L34-1190-05	COIL					
L1			L34-1243-05	COIL	407T			K2	
L1			L34-1244-05	COIL	408T			K	
L2, 3			L34-1148-05	COIL	601T				
L4, 5			L39-0421-05	COIL				K2	
L4, 5			L39-0427-05	COIL				K	
L6, 7			L34-0742-05	COIL	305T				
L8, 9			L34-1134-05	COIL	505T				
L10, 11			L34-1147-05	COIL	407T				
L12, 13			L34-1249-05	COIL				K2	
L12, 13			L34-1250-05	COIL				K	
L14, 15			L34-1146-05	COIL	601.5T			K2	
L14, 15			L34-1257-05	COIL	602.5T			K	
L16			L34-1151-05	COIL	606T			K	
L16		*	L34-1240-05	COIL	605.5T			K2	
L17			L33-0692-05	CHOKE COIL	27UH				
L18			L34-1150-05	COIL	608T			K	
L18			L34-1241-05	COIL	607T			K2	
L19			L34-1151-05	COIL	606T			K2	
L19			L34-1241-05	COIL	607T			K	
L20			L34-1256-05	COIL	604.5T			K2	
L20		*	L34-1259-05	COIL	605.5T			K	
L21, 22			L40-2201-81	SMALL FIXED INDUCTOR	22UH				
L23			L39-0447-05	TROIDAL COIL					
L24, 25			L92-0110-05	CORE					
R1			RS14AB3D1R5J	FL-PROOF RS	1.5	J	2W		
R2			RD14FB2B682J	CYLND CHIP R	6.8K	J	1/8W	K	
R2			RD41FB2B392J	CYLND CHIP R	3.9K	J	1/8W	K2	
R3			RD41FB2B330J	CYLND CHIP R	33	J	1/8W	K2	
R3			RD41FB2B390J	CYLND CHIP R	39	J	1/8W	K	
R4			RD41FB2B560J	CYLND CHIP R	56	J	1/8W		
R5			RD41FB2B153J	CYLND CHIP R	15K	J	1/8W		
R6			RD41FB2B100J	CYLND CHIP R	10	J	1/8W		
R7			RD41FB2B470J	CYLND CHIP R	47	J	1/8W		
R8			RD41FB2B103J	CYLND CHIP R	10K	J	1/8W		
R9			RD41FB2B122J	CYLND CHIP R	1.2K	J	1/8W		
R10			RD41FB2B392J	CYLND CHIP R	3.9K	J	1/8W		
R11			RD41FB2B102J	CYLND CHIP R	1.0K	J	1/8W		
R12			RD41FB2B221J	CYLND CHIP R	220	J	1/8W		
R13			RD41FB2B102J	CYLND CHIP R	1.0K	J	1/8W		
R14			RD41FB2B122J	CYLND CHIP R	1.2K	J	1/8W		
R15			RS14AB3A470J	FL-PROOF RS	47	J	1W		
R16, 17			RS14AB3B100J	FL-PROOF RS	10	J	1W		
VR1			R12-3430-05	TRIMMING POT.	10K				
K1			S51-1437-05	RELAY	9V DC				
D1, 2			1SS101	DIODE					
D3			1SS184	CHIP DIODE					
D4			SG-5LR	DIODE					

# TK-620(H)

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D5, 6 Q1, 2 Q3 - 5 TH1	2A		1SS184 2SC2904 2SC2712(Y) SDT1000	CHIP DIODE TRANSISTOR CHIP TRANSISTOR THERMISTOR	10K					
<b>DRIVE UNIT (X45-3260-XX) -10 : K -11 : K2</b>										
C101 C102 C103, 104 C105 C106			CC73FCH1H680J CC73FCH1H331J CK73FB1H472K CE04EW1C100M CK73FB1H472K	CHIP C CHIP C CHIP C ELECTRO CHIP C	68PF 330PF 4700PF 10UF 4700PF	J J K 16WV K				
C107 C108, 109 C110 C111 C112			CC73FCH1H221J CK73FB1H472K CK73EB1H472K CK73FB1H472K CK73EB1E104K	CHIP C CHIP C CHIP C CHIP C CHIP C	220PF 4700PF 4700PF 4700PF 0.10UF	J K K K K				
C113 C114 C115, 116 C117 C118			C90-2022-05 CK45B1H152K C91-1056-05 CK73EB1E104K C90-2022-05	OS CERAMIC CHIP C CHIP C OS	22UF 1500PF 4700PF 0.10UF 22UF	16WV K K K 16WV				
C119 C119 C120 C121, 122 C121, 122			CC73FCH1H221J CC73FCH1H331J CC73FCH1H221J CC73FCH1H221J CC73FCH1H331J	CHIP C CHIP C CHIP C CHIP C CHIP C	220PF 330PF 220PF 220PF 330PF	J J J J J	K2 K	K2 K		
C123 C124 C125 C126, 127 C128			C91-1056-05 CK73FB1B472K C90-2044-05 CK73FB1H472K CC73FCH1H331J	CHIP C CHIP C ELECTRO CHIP C CHIP C	4700PF 4700PF 1UF 4700PF 330PF	K K 25WV K J				
C129			CC73FCH1H101J	CHIP C	100PF	J				
CN101 CN102			E04-0159-05 E40-0608-05	RF COAXIAL CABLE RECEPTACLE PIN CONNCTOR (6P)						
L101 L102 L103 L104 L105			L34-0893-05 L40-2292-14 L34-0894-05 L33-0666-05 L34-0908-05	COIL SMALL FIXED INDUCTOR COIL CHOKE COIL COIL	3ø4T 3ø5T 3ø5T 3ø9.5T		2.2UH			
L106 L107 L108 L109 L110	*		L33-0666-05 L34-1113-05 L34-0742-05 L34-1242-05 L34-0742-05	CHOKE COIL COIL COIL COIL COIL	3ø1.5T 3ø5T 4ø6T 3ø5T			K		
L110 L111 L111 L112 L113			L34-1039-05 L34-1243-05 L34-1244-05 L33-0666-05 L34-1025-05	COIL COIL COIL CHOKE COIL COIL	4ø1.5T 4ø7T 4ø8T 3ø5.5T			K2 K2 K		
L114, 115			L92-0110-05	CORE						
R101 R102 R103			RD41FB2B121J RD41FB2B470J RD41FB2B121J	CYLND CHIP R CYLND CHIP R CYLND CHIP R	120 47 120	J J J	1/8W 1/8W 1/8W			

E : Scandinavia & Europe  
U : PX (Far East, Hawaii)  
UE : AAFES (Europe)

K : USA  
T : England  
X : Australia

P : Canada

M : Other Areas

▲ indicates safety critical components.

## PARTS LIST

\* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No.	Address	New Parts	Parts No.	Description					Desti- nation	Re- marks
R104			RD41FB2B222J	CYLND CHIP R	2.2K	J	1/8W			
R105			RD41FB2B103J	CYLND CHIP R	10K	J	1/8W			
R106			RD41FB2B121J	CYLND CHIP R	120	J	1/8W		K2	
R106			RD41FB2B560J	CYLND CHIP R	56	J	1/8W		K	
R107			RD41FB2B180J	CYLND CHIP R	18	J	1/8W			
R108			RD41FB2B101J	CYLND CHIP R	100	J	1/8W			
R109			RD14BB2C100J	RD	10	J	1/6W			
R110			RD14BB2C271J	RD	270	J	1/6W			
R111			RD14BB2C121J	RD	120	J	1/6W		K2	
R111			RD14BB2C680J	RD	68	J	1/6W		K	
R112			RD14BB2C470J	RD	47	J	1/6W			
R113			RS14AB3A121J	FL-PROOF RS	120	J	1W		K2	
R113			RS14AB3A680J	FL-PROOF RS	68	J	1W		K	
R114			RD41FB2B102J	CYLND CHIP R	1.0K	J	1/8W			
R116			RS14DB3H101J	FL-PROOF RS	100	J	5W		K2	
R116			RS14DB3H470J	FL-PROOF RS	47	J	5W		K	
D101, 102			1SS184	CHIP DIODE						
Q101		3B	2SC2538-22-A	TRANSISTOR						
Q102		3A	2SC1971	TRANSISTOR						
Q103		3A	2SC1972	TRANSISTOR						
Q104		3A	2SB951A(Q)	TRANSISTOR						

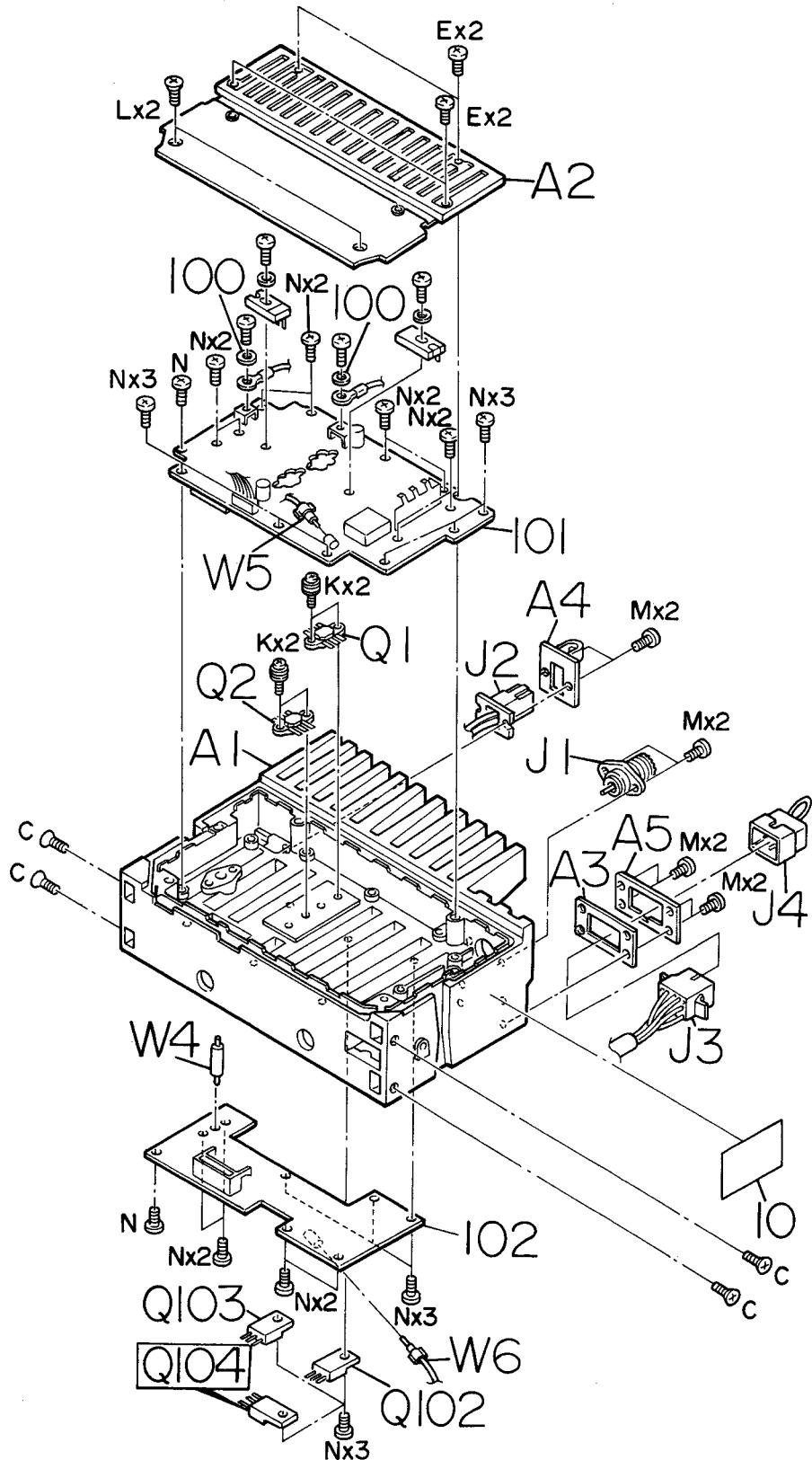
## FINAL ASS'Y (X60-3130-XX) -10 : K -11 : K2

J1	2B		E04-0167-05	RF COAXIAL CABLE RECEPTACLE						
J2	2B		E31-3383-05	CONNECTOR WITH LEAD						
J3	3B		E31-3384-05	CONNECTOR WITH LEAD						
W4	3A		E31-3256-05	CONNECTOR WIRE						
W5	2A		E31-2104-05	CONNECTOR WITH LEAD (RX)						
W6	3B		E31-3123-05	CONNECTOR WITH LEAD (TX)						
A1	2A		F01-0964-01	HEAT SINK						
A2	1B		F11-1107-02	SHIELDING COVER						
A3	2B		G53-0540-04	PACKING						
A4	2B		J21-4241-04	MOUNTING HARDWARE (POWER SUPPLY)						
A5	2B		J21-4242-04	MOUNTING HARDWARE (ACCY)						
100	1A		N16-0040-41	SPRING WASHER						
E	1B		N35-3008-45	BINDING HEAD MACHINE SCREW						
K	2A		N09-0626-04	SCREW						
L	1A		N32-3008-41	FLAT HEAD MACHINE SCREW						
M	2B		N87-3008-41	BRAZIER HEAD TAPTRITE SCREW						
N	1A, 3A		N87-3008-46	BRAZIER HEAD TAPTRITE SCREW						
101	2B		X45-3240-10	FINAL UNIT					K	
101	2B		X45-3240-11	FINAL UNIT					K2	
102	3B		X45-3260-10	DRIVE UNIT					K	
102	3B		X45-3260-11	DRIVE UNIT					K2	

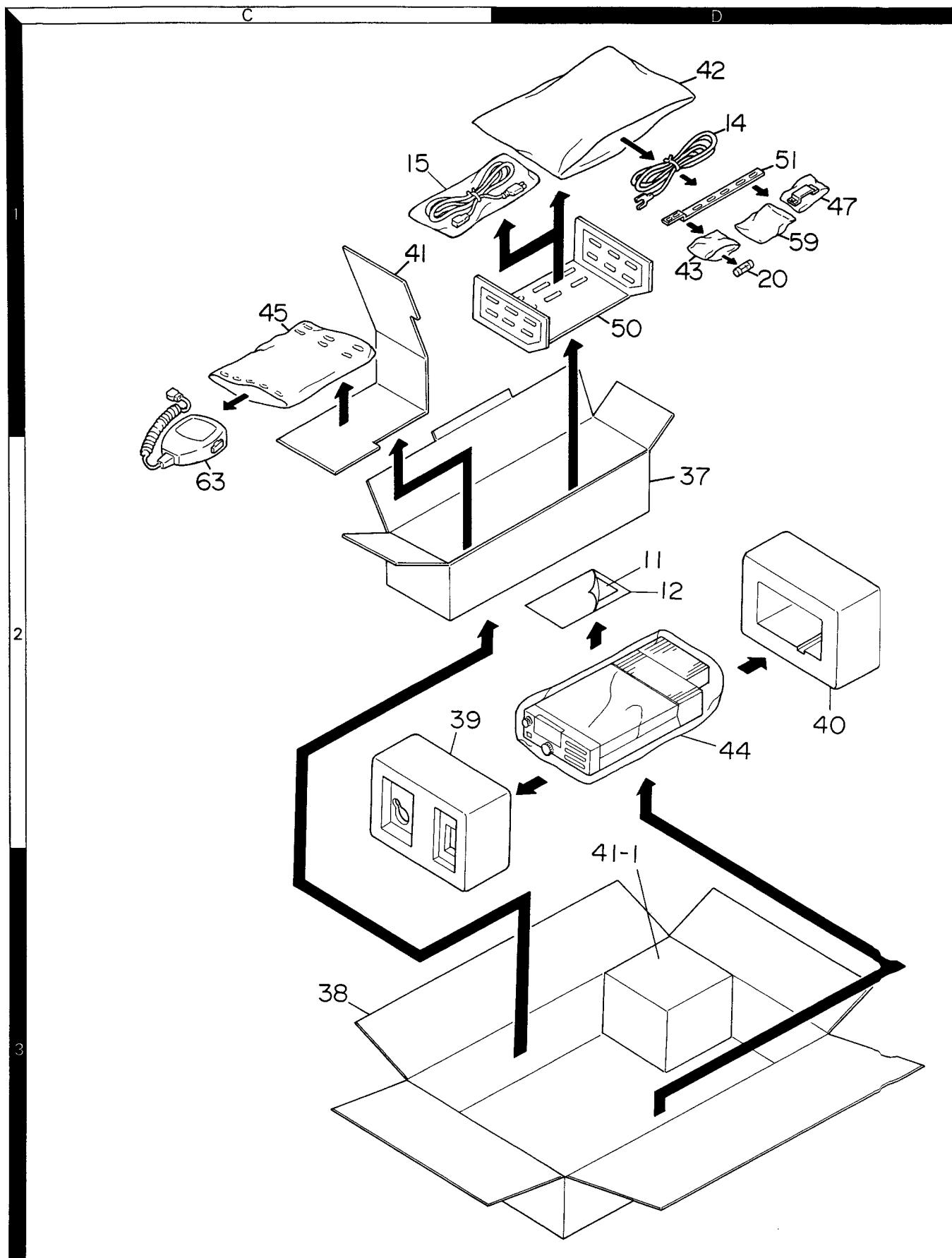
# TK-620(H)

## DISASSEMBLY

Final ass'y 110W version (70).



## PACKING



# TK-620(H)

## ADJUSTMENT

### Test equipment required for alignment

Test Equipment	Major Specifications		
1. Standard Signal Generator (SSG)	Frequency range	29 to 50MHz	
	Modulation	Frequency modulation and external modulation.	
	Output	0.1μV to greater than 1mV	
2. Power meter	Input impedance	50 ohms	
	Operation frequency	29 to 50MHz or more.	
	Measurement capability	Vicinity of 200W.	
3. Deviation meter	Frequency range	29 to 50MHz.	
4. Digital Volt Meter	Measuring range	1~15V DC.	
	Accuracy	High input impedance for minimum circuit loading.	
5. Oscilloscope		DC through 30MHz.	
6. High sensitivity frequency counter	Frequency range	10Hz to 100MHz.	
	Frequency stability	0.2 ppm or less.	
7. Ammeter		30A.	
8. AF Volt Meter (AFVTVM)	Frequency range	50Hz to 10kHz.	
	Voltage range	3mV to 3V.	
9. Audio Generator (AG)	Frequency range	50Hz to 5kHz or more.	
	Output	0 and 1V.	
10. Distortion meter	Capability	3% or less at 1kHz.	
	Input level	50mV to 10Vrms.	
11. Voltmeter	Measuring range	1.5 to 10V DC or less.	
	Input impedance	50 kohms/V or greater.	
12. 4 ohm dummy load		Approx. 4 ohm, 5W.	
13. Regulated power supply		13.4V, approx. 30A. (adjustable from 9~16V) Useful if ammeter equipped.	

The set has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

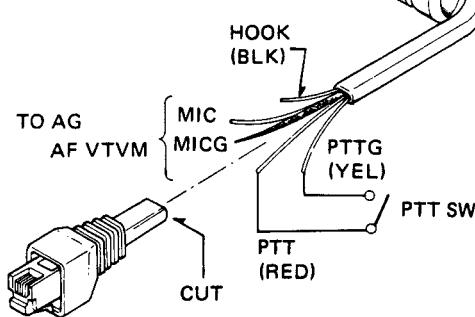
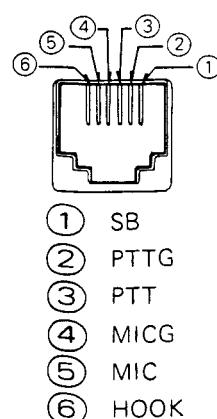
	RX freq' fR ( ) MHz			TX freq' fT ( ) MHz		
	L	M	H	L	M	H
TK-620(H)	K	35.9	36.4	36.9	36.0	36.5
	K2	48.9	49.4	49.9	49.0	49.5
						50.0

L : Low freq' M : Mid freq' H : Hi freq'

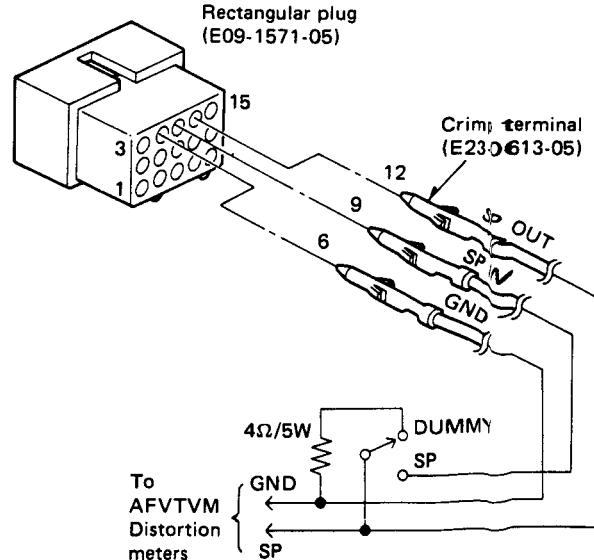
### MIC connector

#### front view

- The following test cables are recommended.



Test cable for Microphone input



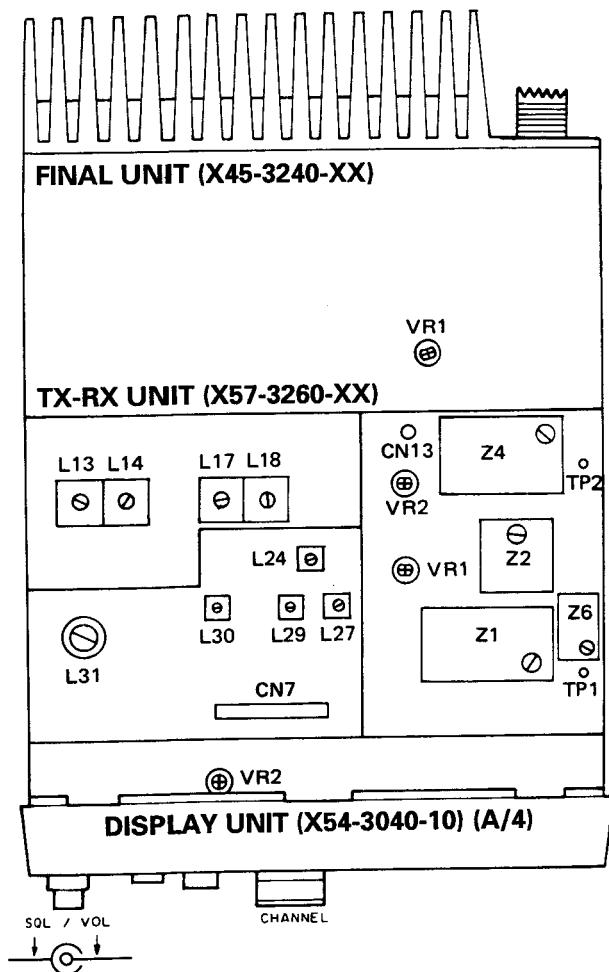
Test cable for Speaker output

# TK-620(H)

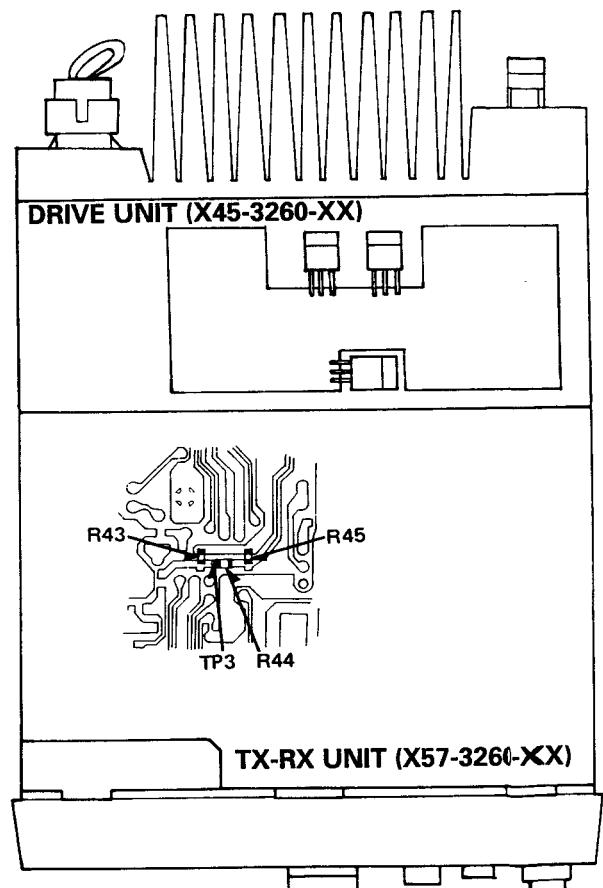
## ADJUSTMENT

### Adjustment location

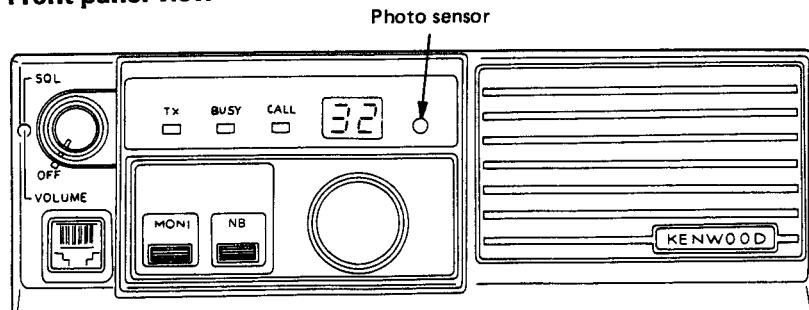
Top view



Bottom view



Front panel view

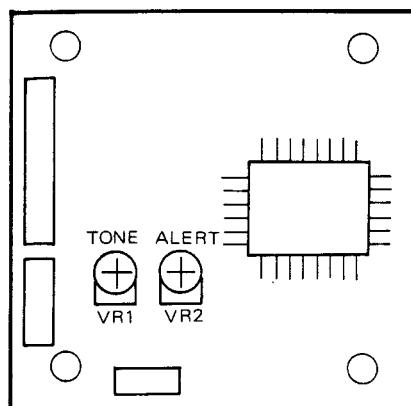


# TK-620(H)

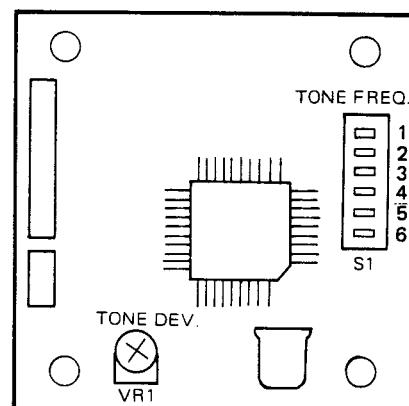
## ADJUSTMENT

### Adjustment points

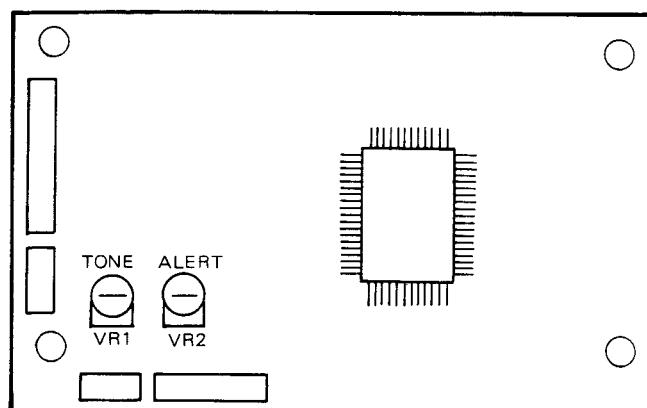
KMS-5



KQT-7



KS-2



**Confirmation of control function (in case KSK-2 control data has not been set.)**  
**(Please check only when the KSK-2 (Option) is added.)**

Item	Condition	Operation check
	No conditions are specified. Microphone (MIC) : OFF HOOK SQL VOL : CW MAX MONI SW : OFF Number of channels to be at least two.	
1. Confirmation of DEL/ADD function	1) SCAN SW : OFF Press DEL/ADD SW	If DEL/ADD lamp has been turned off, it is turned on and "pip" sound is heard once.
	2) SCAN SW : ON Press DEL/ADD SW	If DEL/ADD lamp has been turned on, it is turned off and "pip" sound is heard twice.
2. Confirmation of operation of channel switch	1) SCAN SW : OFF	When channel switch is turned, indicated channel changes.
	2) SCAN SW : ON	
3. Check of SCAN and selectable priority channel	1) SCAN SW : ON MIC : ON HOOK	Channel display indicates
	2) MIC : OFF HOOK or MONI SW : ON SQL VOL : CCW MAX	Channel before scanning to be indicated.
4. Confirmation of PTT	1) SCAN SW : OFF PTT SW : ON	TX display to be turned on.
	2) PTT SW : OFF	
	3) PTT SW : ON MIC : ON HOOK	TX display to be turned off.

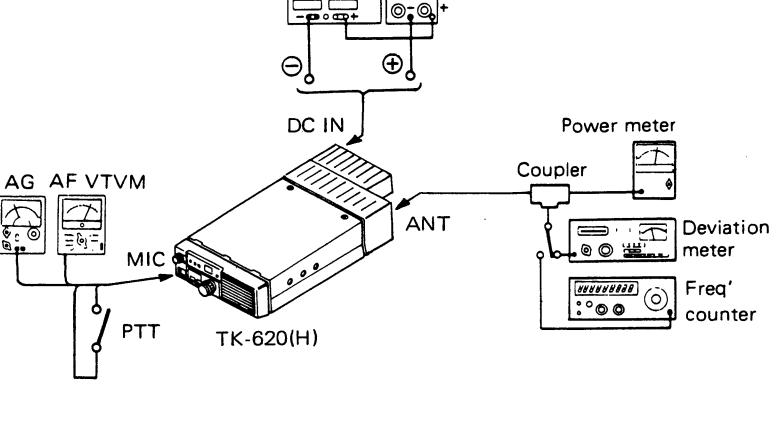
## TK-620(H)

## **ADJUSTMENT**

# TK-620(H)

## **ADJUSTMENT**

## Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Write freq' designed with EEPROM writer. 2) Connect the power cable to the rear panel. 3) Final unit VR1 : MAX CCW. 4) Power SW : ON							
2. Common PLL Lock Voltage	1) CH : Channel with highest TX FREQ' (fTH). PTT : ON	Power meter DVM	TX-RX	TP1	TX-RX	Z1	6.0V ADJ.	±0.1V
3. TX PLL Lock Voltage				TP2		Z4	5.0V ADJ. Maximize voltage if it does not reach to 5V.	±0.1V
4. TCXO Freq' ADJ.	1) CH : Channel with TX center FREQ' (fTM). PTT : OFF (RX) <b>Note</b> : TCXO is adjusted precisely at 25°C. If it is readjusted, the frequency stability is changed. Do not touch it normally.	Power meter FREQ' counter	TX-RX	TP3 (Foil side)	TX-RX	Z6	f + 10.7MHz ADJ.	±50Hz
5. Power ADJ. (APC)	1) CH : Channel with TX center FREQ' (fTM). PTT : ON	Power meter Ammeter	Rear panel	ANT	Final	TC1	ADJ. MAX power (VR1 : MAX CW.)	121W or more.
	2) CH : Channel with lowest TX FREQ' (fTL) and channel with highest TX FREQ' (fTH). PTT : ON					TC2	VR1 113W ADJ.	±3W, 22A or less.
6. Protection	1) CH : Channel with lowest TX FREQ' (fTL) and channel with highest TX FREQ' (fTH). ANT : Short and open PTT : ON	Ammeter	Rear panel	Power connector			Check	20A or less.
7. Transmit Freq' ADJ.	1) CH : Channel with TX center FREQ' (fTM). ANT : Power meter PTT : ON	Power meter FREQ' counter	Rear panel	ANT	TX-RX	Z2	FREQ' ADJ. of TX	±50Hz
	2) CH : Check other channel. PTT : ON						Check	

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
8. Tone deviation ADJ. KMS-5, KQT-7 and KSK-2 (Option)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. Deviation meter filter : LFP : 3kHz, HPF : OFF, De-emphasis : OFF PTT : ON	Power meter Deviation meter	Rear panel	ANT	KMS-5	VR1	$\pm 0.75\text{kHz}$	$\pm 100\text{Hz}$	
					KQT-7	VR1			
					SKS-2	VR1			
9. Maximum deviation ADJ.	1) Connect AG to the MIC terminal. AG : 1kHz/50mV Deviation meter filter : LPF : 20kHz, HPF : 50Hz, De-emphasis : 750 $\mu$ sec. TX-RX unit VR1 : MAX CW. CH : Channel with highest TX FREQ' (fTH). PTT : ON	Power meter Deviation meter	Rear panel	ANT	TX-RX	VR2	$\pm 4.4\text{kHz}$ ADJ. ( $\pm 4.9\text{kHz}$ ADJ. when signaling unit installed.) Adjust one more than the other by switching between -P and +P.	$\pm 100\text{Hz}$	
10. MIC sensitivity ADJ.	1) AG : 1kHz/5mV				TX-RX	VR1	$\pm 3.0\text{kHz}$ ADJ. ( $\pm 3.75\text{kHz}$ ADJ. when signaling unit installed.)	$\pm 100\text{Hz}$	
11. Sensitivity ADJ.	1) CH : Channel with RX center FREQ' (fRM).	AF VTVM 4 $\Omega$ dummy load	Rear panel	EXT. SP	Front panel	AF VOL.	0.78V/4 $\Omega$ (Noise)		
	2) SSG FREQ' : fRM Output : 500 $\mu$ V/-53dBm MOD : OFF	SSG AF VTVM Distortion meter 4 $\Omega$ dummy load	Rear panel	EXT. SP	TX-RX	L13 L14 L17 L18	Reduce noise level using L13, L14, L17 and L18. Decrease the SSG output so that noise level is always 20 to 30dB lower than 0.45V. Repeat 3 to 4 times.		
						L31	Adjust for maximum AF output.		
						L24 L27 L29 L30	Adjust for maximum SINAD.		
	3) SSG Output : 500 $\mu$ V/-53dBm MOD : 1kHz/ $\pm$ 3kHz DEV.		Front panel	AF VOL.		0.45V/4 $\Omega$ ADJ.			
						Check	SINAD 12dB or more.		
4) SSG Output : 0.32 $\mu$ V/-117dBm		Front panel	AF VOL.			0.45V/4 $\Omega$ ADJ.			
						Check	SINAD 12dB or more.		
5) CH : Channel with lowest RX FREQ' (fRL) and channel with highest RX FREQ' (fRH). SSG FREQ' : fRL or fRH Output : 0.32 $\mu$ V/-117dBm		Front panel	AF VOL.			0.45V/4 $\Omega$ ADJ.			
						Check	SINAD 12dB or more.		

# TK-620(H)

## ADJUSTMENT

# TK-620(H)

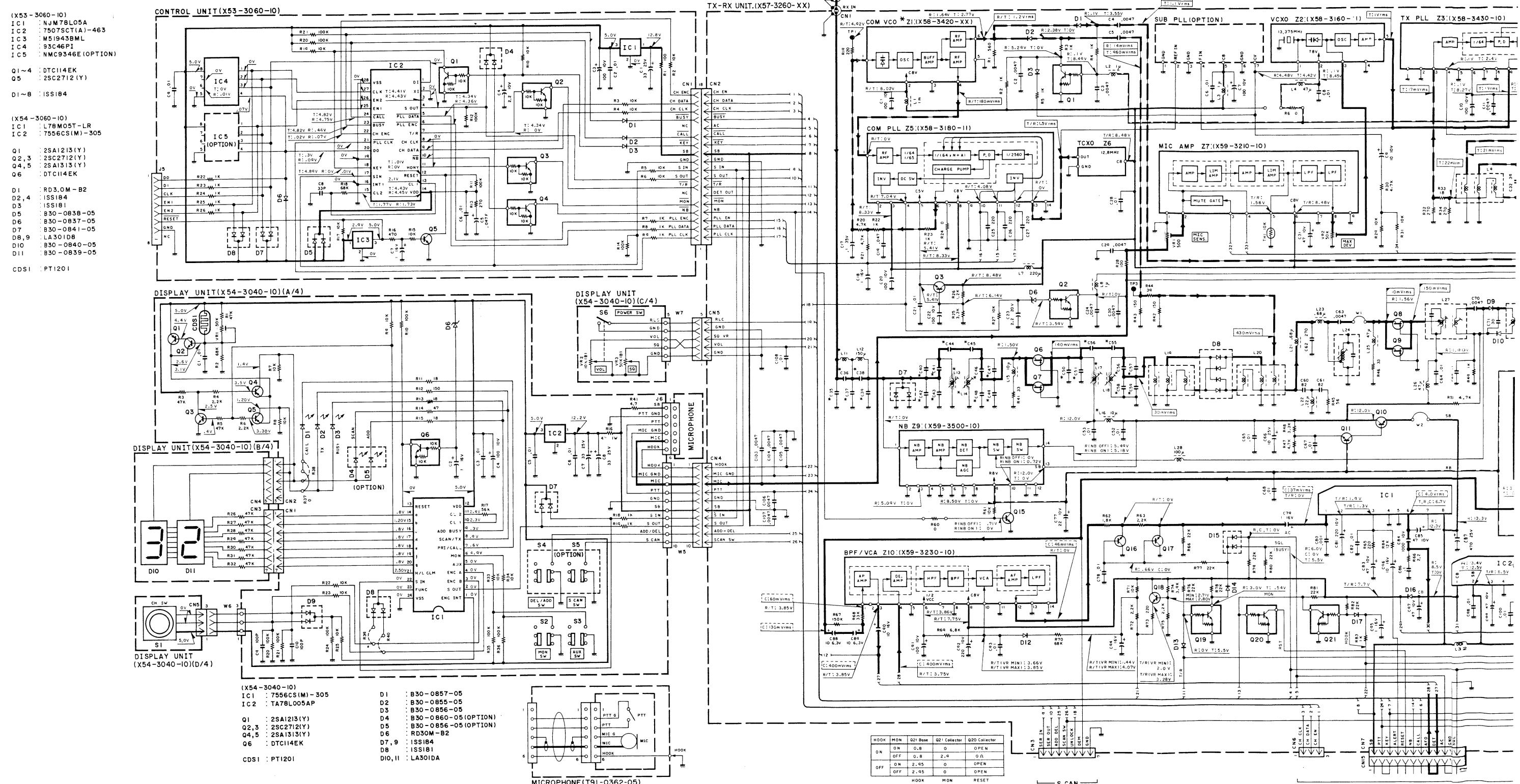
## TERMINAL FUNCTIONS

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	6) CH : Channel with RX center FREQ' (fRM). SSG FREQ' : fRM Output : 500μV/-53dBm	SSG AF VTVM Distortion meter 4Ω dummy load	Rear panel	EXT.SP	Font Panel	AF VOL.	4.0V/4Ω ADJ.	
						Check		S/N 50dB or more. Distortion : 5% or less.
12. Squelch	1) SSG Output : OFF Rotate SQUELCH to a point at which noise disappears.  2) SSG Output : 0.2μV/-121dBm	SSG AF VTVM 4Ω dummy load Oscillo- scope	Rear panel	EXT.SP				SQL index angle : 8:00 ~ 10:00  Squelch should open. BUSY LED should light.
13. NB	1) SSG Output : 1.58μV/-103dBm MOD : 1kHz/±3kHz DEV.	SSG Oscillo- scope Noise generator	Rear panel	EXT.SP		NB : ON		Confirm noise reduce by NB on. NB LED should light.
14. Adjusting decoder sensitivity for signaling squelch KMS-5, KQT-7 and KSK-2 (Option)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. SSG FREQ' : Set it to the FREQ' of the channel mentioned above. SSG Output : Turn the SSG output so that the SINAD sensitivity becomes 10dB.  2) SSG MOD SW : EXT. MOD AG1 FREQ' : 1kHz AG2 FREQ' : QT tone freq'.  3) AG1 : Power switch OFF. AG2 Output : Adjust the output level of AG2 so that SSG deviation becomes 0.75kHz.  4) AG1 : Power switch ON. AG1 Output : Adjust the output level of AG1 so that the SSG deviation becomes 3.75kHz. (i.e., QT tone frequency/ 0.75kHz deviation, +1kHz/3kHz deviation) MIC hook : ON hook MONI SW : OFF							
15. Auto dimmer	1) Blind the photo sensor on the front panel.			Display	VR2	Adjust : Center position		
					Check		The LED display should be dimly lit.	
16. ALERT tone level ADJ.	The ALERT tone is generated when the DEL/ADD switch is opened, in the time-out-time operation, etc. The ALERT tone level can be adjusted as desired with KMS-5 : VR2 and KSK-2 : VR2.							

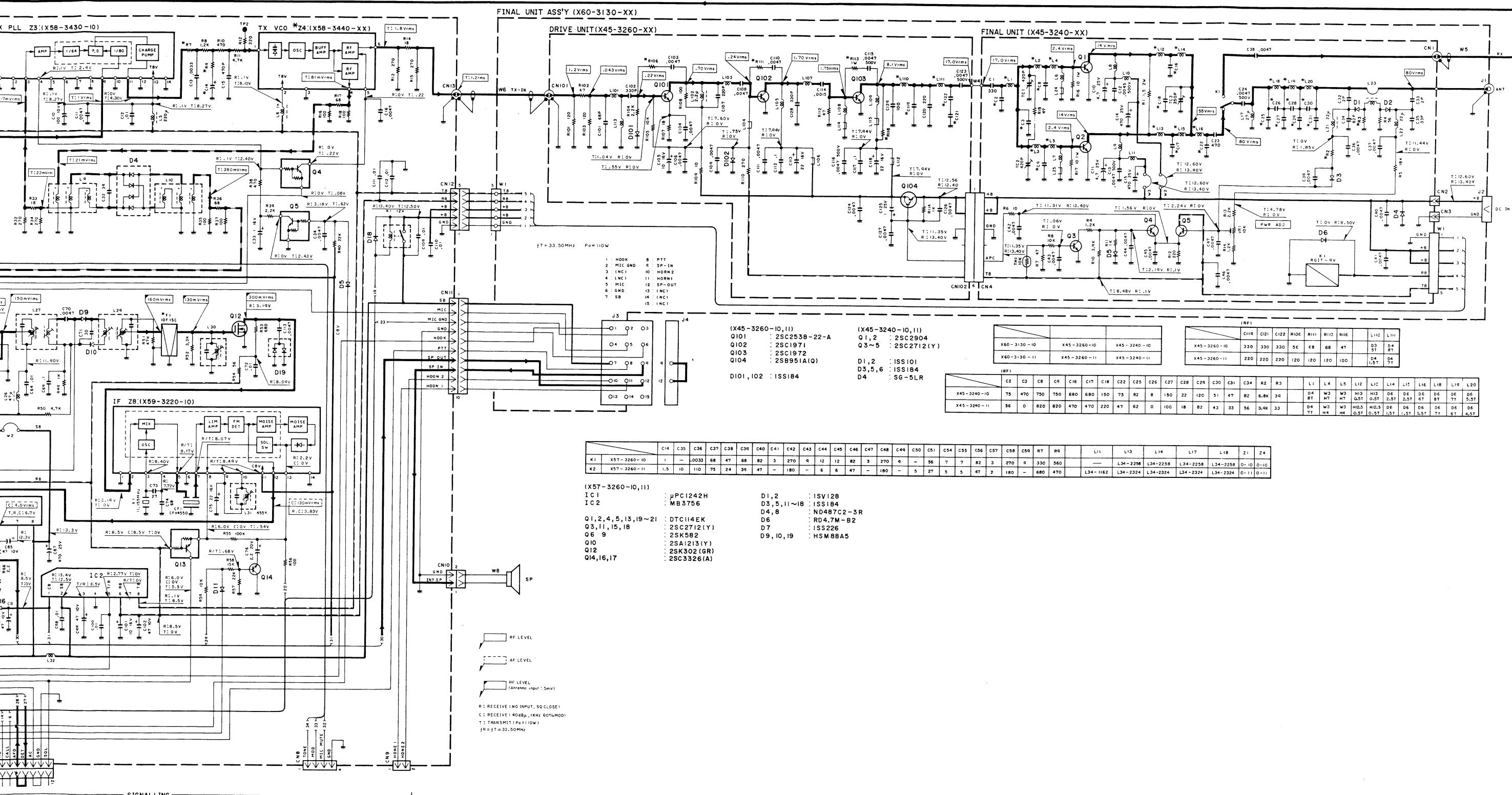
Connector No.	Terminal No.	Terminal Name	Terminal Function
<b>FINAL ASS'Y (X60-3130-XX)</b>			
CN1	-	RX	Receive signal output, coaxial connector.
CN2	-	+B	Power supply input.
CN3	-	GND	GND.
CN4 (CN102)	1 2 3 4 5 6	+B +B GND — APC T8	Power supply output (input). Power supply output (input). GND. No connect. APC control signal output (input). 8V output (input) during TX.
CN101	-	TX	Transmission drive input, coaxial connector.
W1	1 2 3 4 5	GND +B +B R8 T8	GND. Power supply output (to TX-RX). Power supply output (to TX-RX). 8V input during reception. 8V input during transmission.
W4	-	-	Connecting cable between final unit to final unit.
J1	-	ANT	For connection of antenna, M-type coaxial connector.
J2	1 2	+B GND	Power supply input. GND.
J3	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	HOOK MIC GND — — MIC GND SB PTT SP IN HORN2 HORN1 SP OUT	HOOK signal (mic hook) input. MIC GND. No connect. No connect. MIC signal input. GND. Power supply output via the power switch. PTT signal input. Internal speaker input (for control head). HORN control output. HORN control output. External speaker output. No connect. No connect. No connect.

# SCHEMATIC D

— Signal line    - - - Control line    — Common DC line    - - - Adjusting points



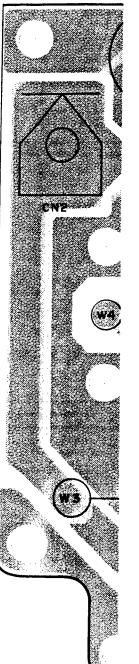
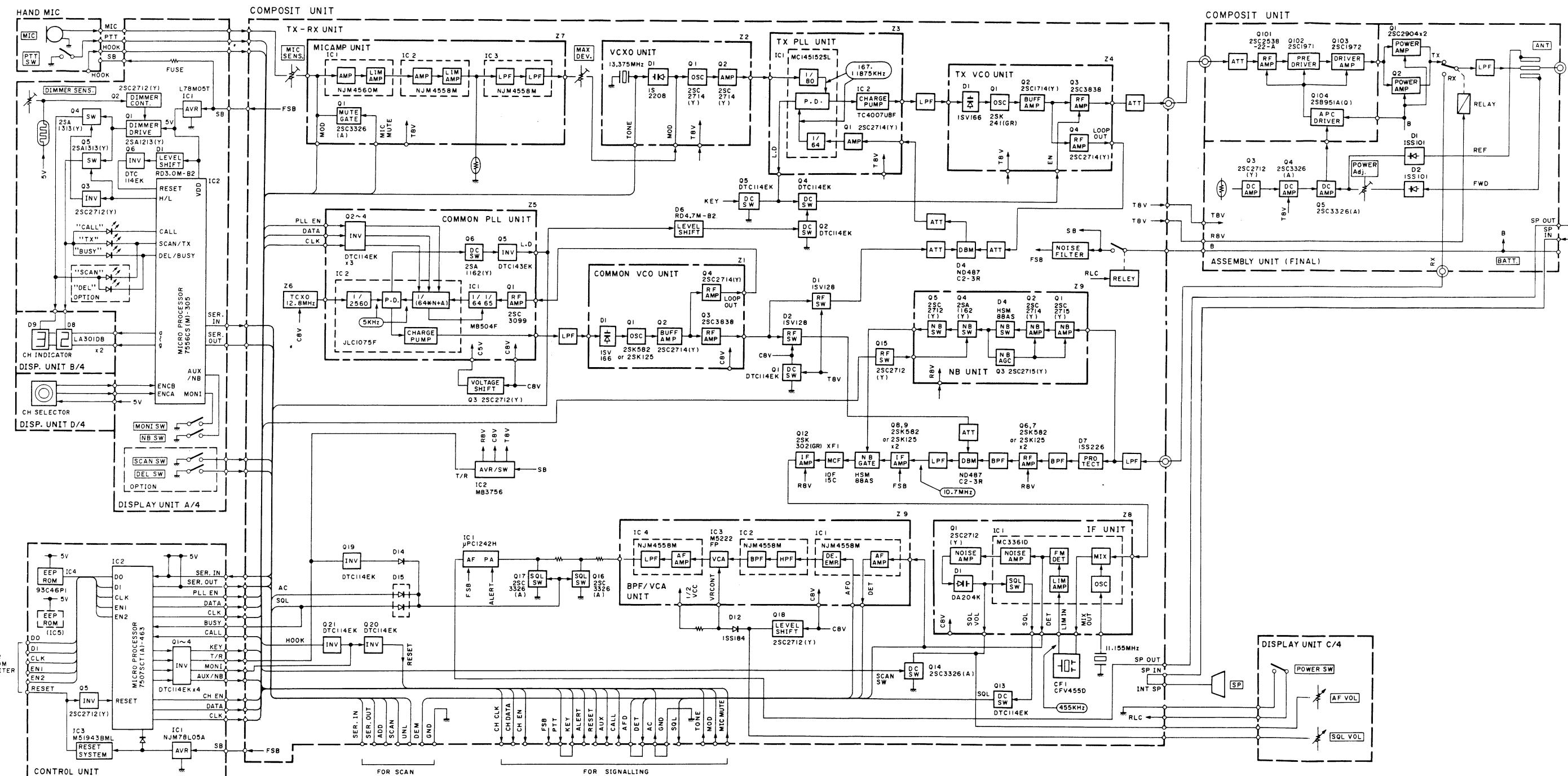
## SCHEMATIC DIAGRAM



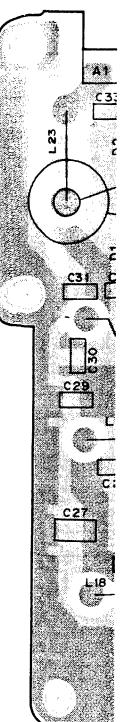
# TK-620(H) TK-620(H) BLOCK DIAGRAM

A  
TK-1

## FINAL UP

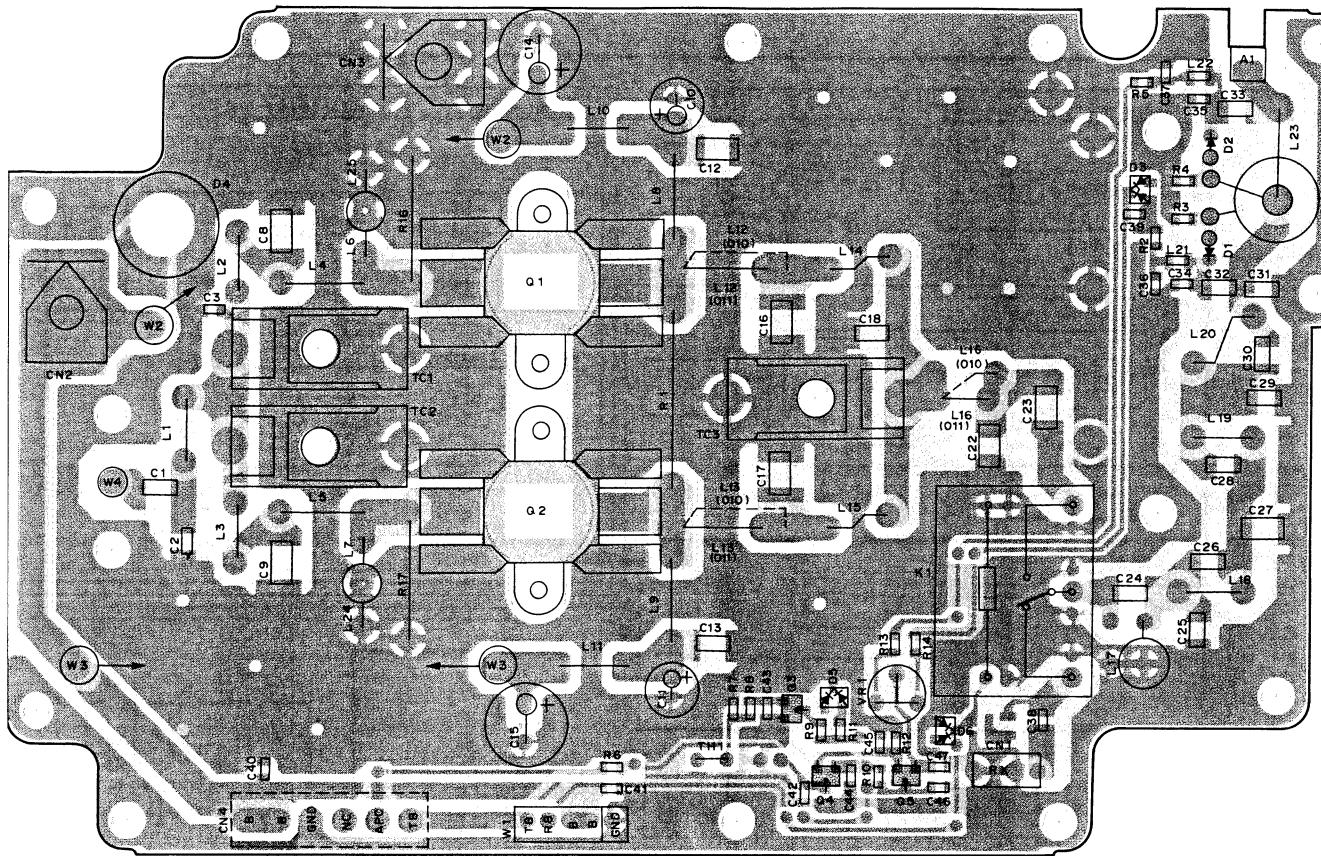


Foil side vi

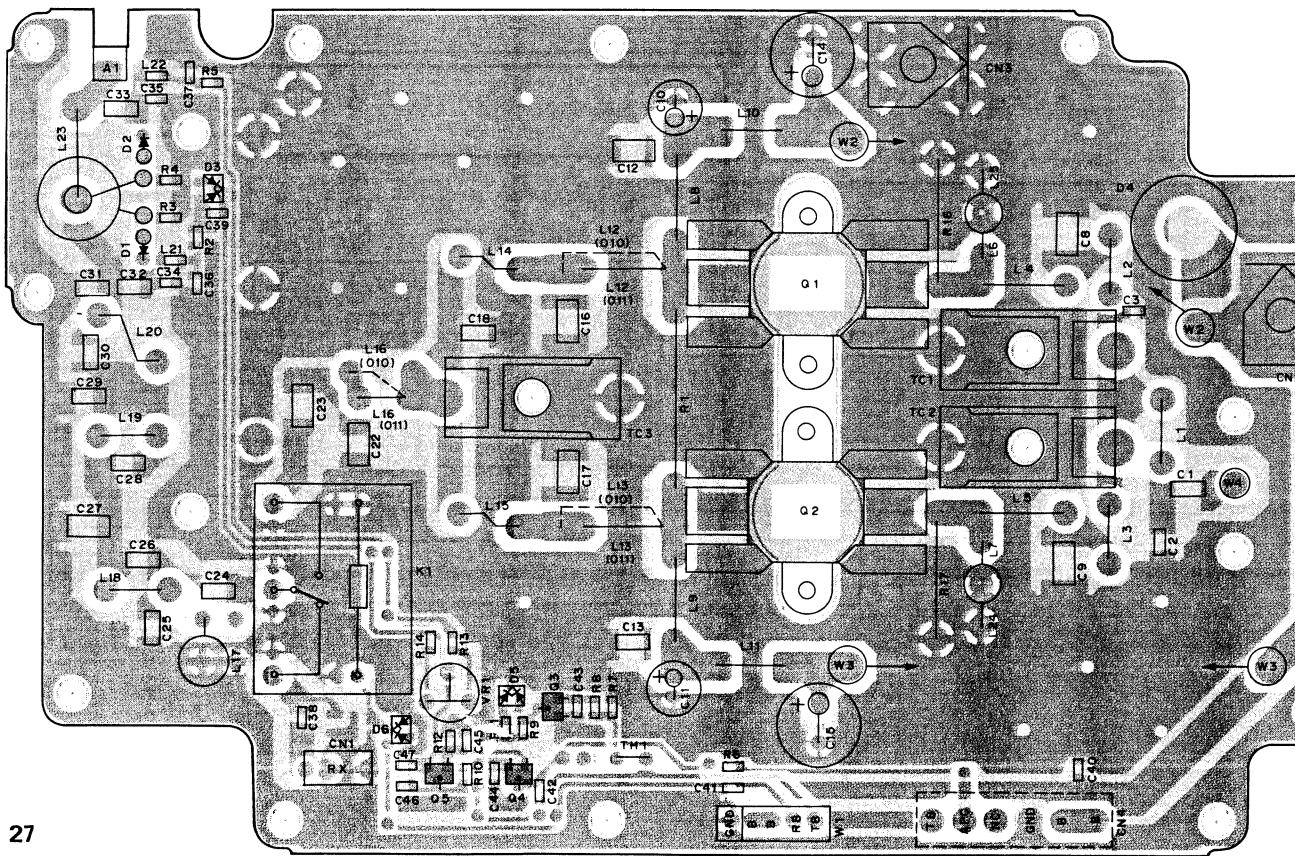


## TK-620(H) PC BOARD VIEWS

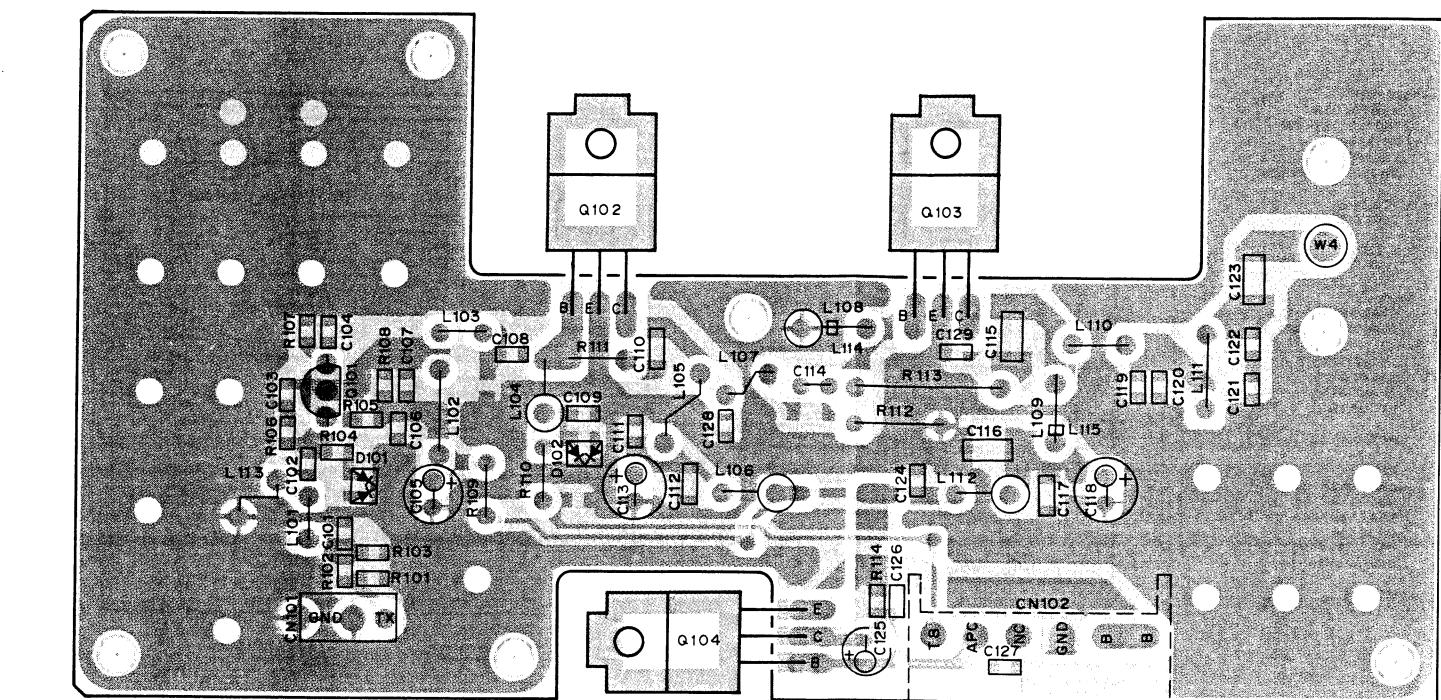
FINAL UNIT (X45-3240-XX) -10 : K -11 : K2 Component side view



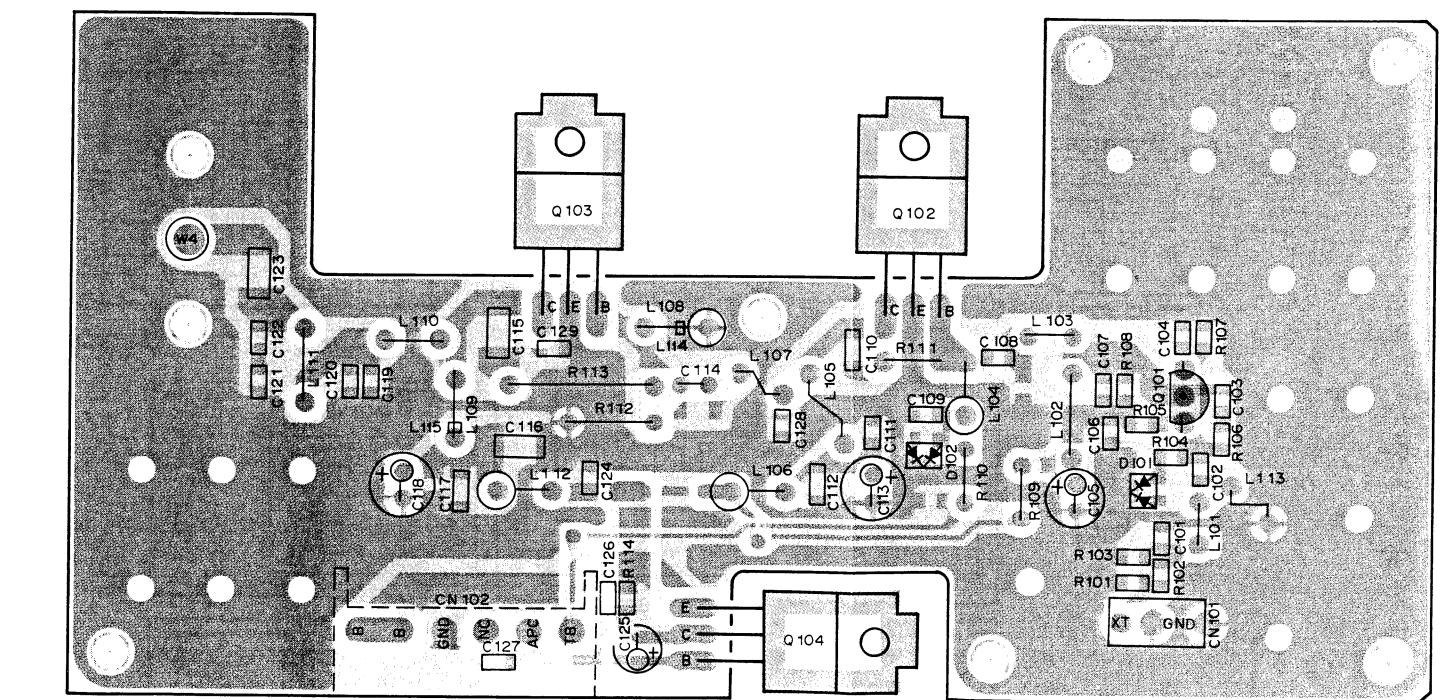
## Foil side view



DRIVE UNIT (X45-3260-XX) -10 : K -11 : K2 Component side view



**Foil side**



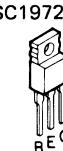
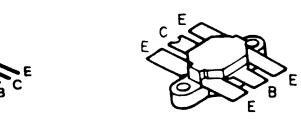
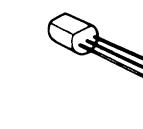
25

28

2SC2538

2SC290

2SC1971  
2SC1972



# TK-620(H)

## SPECIFICATIONS

### GENERAL

Frequency Range .....	29.7 to 50MHz
Number of Channels .....	32 semi-duplex channels (Modifiable to 64 semi-duplex channels)
Chennel Spacing .....	20kHz (PLL channel step 5kHz)
Input Voltage .....	13.4V DC negative ground
Current Drain .....	0.4A on standby
.....	1.0A on receive
.....	25A on transmit
Duty Cycle .....	Receiver 100%, Transmitter 20%
Temperature Range .....	-30°C to +60°C (-22°F to +140°F)
Dimensions .....	7.05" (179mm) W x 2.36" (60mm) H x 12.36" (314mm) D
Weight .....	8.38lbs (3.8kg)

### RECEIVER

(Measurements made per EIA standard EIA-204-C)

RF Input Impedance .....	50Ω
Sensitivity	
EIA 12dB SINAD .....	0.25µV
20dB Quieting .....	0.35µV
Squelch Sensitivity .....	0.2µV threshold
Modulation Acceptance .....	±7kHz
Selectivity .....	-80dB
Intermodulation .....	-75dB
Spurious and Image Rejection .....	-85dB
Audio Power Output .....	4W at 4Ω less than 5% distortion
Frequency Stability .....	±0.002% from -30°C to +60°C
Channel Frequency Spread .....	1MHz

### TRANSMITTER

(Measurements made per EIA standard EIA-152-B)

RF Power Output .....	110W adjustable to 60W
RF Output Impedance .....	50Ω
Spurious and Harmonics .....	-70dB
Modulation	
Direct FM Modulation .....	F3E, ±5kHz for 100% at 1000Hz
FM Noise .....	-50dB
Microphone Impedance .....	Low impedance
Audio Distortion .....	Less than 3% at 1000Hz
Frequency Stability .....	±0.002% from -30°C to +60°C
Channel Frequency Spread .....	1MHz

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